Date: Wednesday, 06/08/2008 2:06:51 PM
User: Julie Lecocq

Process Sheet

Customer	: CU-DAR001 Dart Helicopters Services	**Drawing Name**	: SUPPORT
Job Number	: 41031		
Estimate Number	: 10546		
P.O. Number	:	**Part Number**	: D30631
This Issue	: 06/08/2008 **S.O. No.** :	**Drawing Number**	: D3063 REV A
Prsht Rev.	: NC	**Project Number**	: N/A
First Issue	: / / **Type** : MACHINED PARTS	**Drawing Revision**	: A
Previous Run	: 35691	**Material**	:
Written By	:	**Due Date**	: 20/08/2008 **Qty:** 40 **Um:** Each
Checked & Approved By	: JTD 08.8.06		
Comment	: Est:C 02.10.04 Re-format; Blank size change KJ		

Additional Product

Job Number:

Seq. #:	Machine Or Operation:	Description :
1.0	M6061T6B0625X02500	6061-T6 Bar .625 x 2.50

Comment: Qty.: 0.3588 f(s)/Unit Total : 14.3514 f(s)
6061-T6 Bar .625" x 2.5" M103755 x 7 (35)
Material 6061-T6 (QQ-A-200/8 or QQ-A-225/8 or QQ-A-250/11) (M6061T6B0.625x2.500 or M6061T6S.625) Batch: M106298 x 28 J.L 08/08/20

2.0	SHEAR	SHEAR

Comment: SHEAR (35)
Cut blanks 4.000" x 2.500" x 0.625" thick J.L 08/08/20

3.0	HAAS1	HAAS CNC VERTICAL MACHINING #1

Comment: HAAS CNC VERTICAL MACHINING #1 (35)
1-Machine per folio FA175 and Dwg D3063
2-Deburr ~~& Tumble~~ 08.08.06 DTP 08/08/21 J.L

4.0	QC2	INSPECT PARTS AS THEY COME OFF MACHINE

(P10) (35)

Comment: INSPECT PARTS AS THEY COME OFF MACHINE DTP J.L 08/08/21

5.0	QC8	SECOND CHECK

Comment: SECOND CHECK 08/08/21 (35)

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: D3063-1 **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes (No) **DQA:** D **Date:** 08/08/26

D350-591-213/214

QA: N/C Closed: _____ **Date:** _____

NCR: 41031		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			
8/8/20	# 40	two parts found with multiple Problem. 1- Dim 0.900" is 0.178" 0.006" under tol. 2- Dim 0.125" is 0.110" 0.005" under tol. R.C	~~PA~~ 1) 08.08.21 QSI 042	Inspection of SR-D350-591-1 Rev A indicates that 0.172" is acceptable Large +ve margins. See attached 2) Non-critical, weld will fill up missing portion ACCEPTABLE DEVIATIONS	J.L 08/08/20	08/08/20	~~PA~~ 08.08.21 QSI 042	08/08/20

NOTE: Date & initial all entries

Date: Wednesday, 06/08/2008 2:06:51 PM
User: Julie Lecocq

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services **Drawing Name:** SUPPORT

Job Number: 41031 **Part Number:** D30631

Job Number:

Seq. #:	Machine Or Operation:	Description :
6.0	PACKAGING 1	PACKAGING RESOURCE #1

35

Comment: PACKAGING RESOURCE #1
Identify and Stock
Location: PE 5/8/25 SD

7.0	QC21	FINAL INSPECTION/W/O RELEASE

08/08/25

Comment: FINAL INSPECTION/W/O RELEASE

Job Completion

4 08.08.25

Form: rprocess

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

QA: N/C Closed: _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	4031
Description: Support	Part Number:	D3063-1
Inspection Dwg: D3063 **Rev:** A		Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

[X] First Article [ ] Prototype

Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
R0.063	+/-0.010	.063	✓			
R0.125	+/-0.010	.125	✓			
0.566	+/-0.010	.565	✓			
0.375	+/-0.010	.375	✓			
Ø0.257	+0.005/-0.000	.259	✓			
R0.375	+/-0.010	.375	✓			
0.125	+/-0.010	.128	✓			
2.293	+/-0.005	2.293	✓			
0.490	+/-0.010	.489	✓			
0.188	+/-0.010	.181	✓			
2.960	+/-0.010	2.963	✓			

Measured by:	J.L
Date:	08/08/20

Audited by:	
Date:	08/08/21

Prototype Approval:	N/A
Date:	N/A

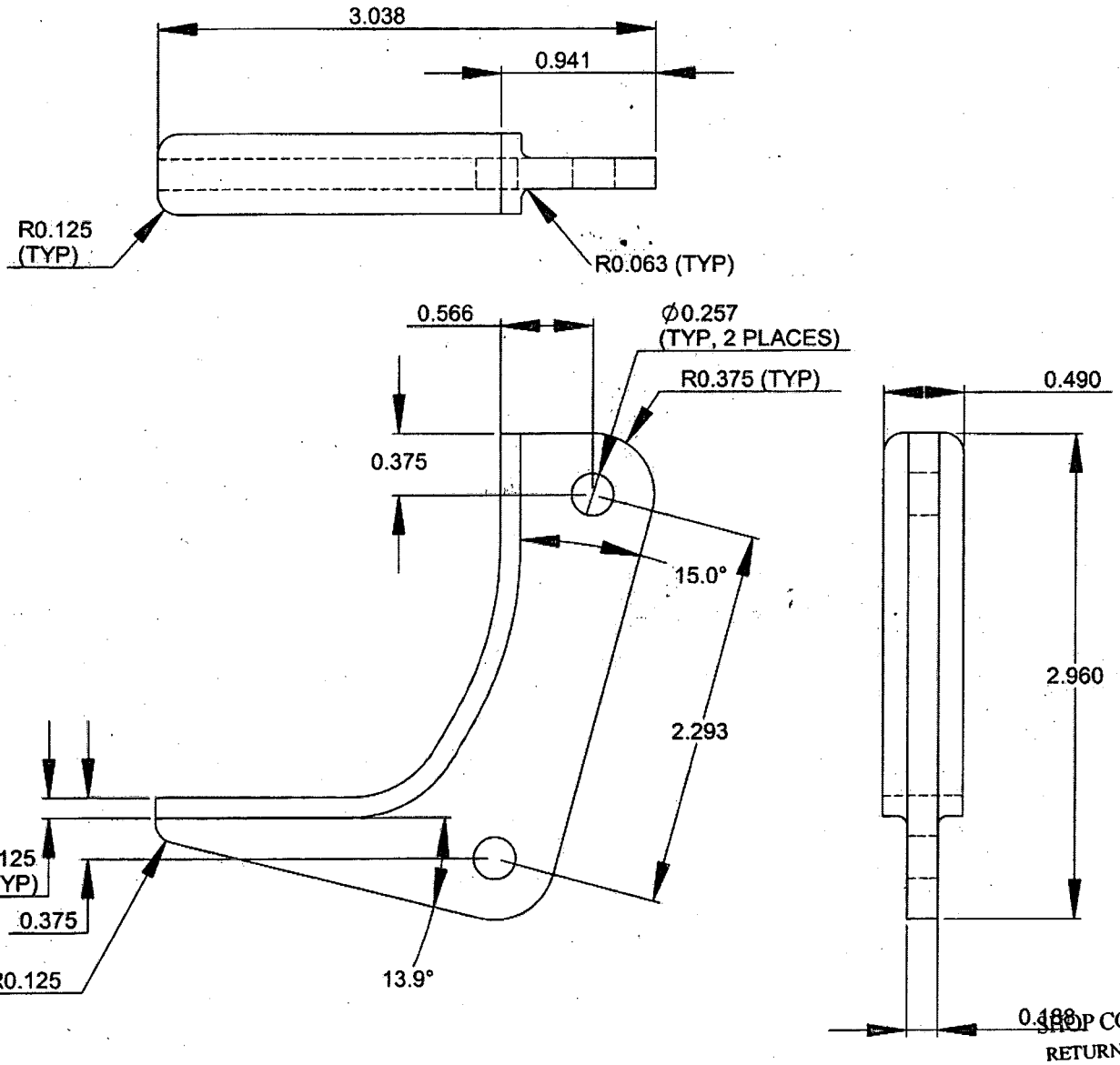
Rev	Date	Change	Revised by	Approved
A	04.01.21	New Issue	KJ/RF	

DESIGN	DRAWN BY	**DART AEROSPACE LTD** HAWKESBURY, ONTARIO, CANADA	
CHECKED	APPROVED	DRAWING NO. D3063	REV. A SHEET 1 OF 1
DATE 02.09.10		TITLE SUPPORT	SCALE 1:1
A	02.09.10	NEW ISSUE	

DART

DA COPY ISSUED

RELEASED 02.09.20



D3063-1 SUPPORT

1) MACHINE PER DWG FILE "D3063-1.SLDPRT"
2) MATERIAL: 6061-T6 (QQ-A-200/8 OR QQ-A-225/8 OR QQ-A-250/11)
(REF DART SPEC M6061T6B OR M6061T6S)
3) FINISH: NONE
4) BREAK ALL SHARP EDGES 0.005 TO 0.015
5) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
6) ALL DIMENSIONS ARE IN INCHES

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WORK ORDER NO. 41031

$MS1b := \frac{Fyt}{Sut} - 1$ $MS1b = 0.40$ **Margin of Safety**, tensile bending stress

Shear Stress

For simplicity, ultimate loads will be compared to yield property values.

$Ss := \frac{SF \cdot W}{A}$ $Ss = 1538 \cdot psi$ Shear stess

$MS3a := \frac{Fys}{Ss} - 1$ $MS3a = 14.57$ **Margin of Safety**, shear

3.2 STRENGTH OF FRONT ATTACHMENT

A comparison between the new and existing steps show that the front attachment on the new steps are of a similar or stronger construction. Both the new and old steps are attached to the skidtube with two AN3 bolts and the step legs are attached to the extrusion with the same number of MS20600AD4 rivets. However, the new high gear steps have an additional spacer that will make the step even stronger.

3.3 STRENGTH OF MID ATTACHMENT

The D350-591-211/-212 Long Steps have a middle support (D3079-041). The clamps (D3064-1) and materials (6061-T6) are identical to the aft support. The total cross-sectional areas of the supports (D3062-1/-2, t=0.250) are greater than the attachment plates (D3063-1 or D3169-1, t=0.188) for the aft attachment. Margins for the mid support location will be the same or greater than the aft support location.

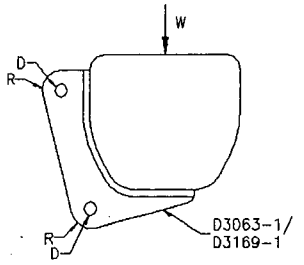
3.4 STRENGTH OF AFT ATTACHMENT

A load of W=2*170*LF*FF (two persons with load factor and fitting factor) will be applied directly over the aft mounting support. All the following analysis conservatively assumes that the entire load is transferred to one bolt. In order to reduce the number of calculations, ultimate loads are applied to yield properties values where appropriate.

3.4.1 MOUNTING PLATE ANALYSIS (D3063-1 and D3169-1)

$FF := 1.15$		Fitting Factor
$D := 0.257 \cdot in + 0.005 \cdot in$	$D = 0.262 \cdot in$	Hole Diameter (with manufacturing tol.)
$Dan4 := 0.250 \cdot in$		AN4 Bolt Diameter
$R := 0.375 \cdot in - 0.025 \cdot in$	$R = 0.350 \cdot in$	Lug Radius (degraded by damage tol.)
$t := 0.188 \cdot in - 0.020 \cdot in$	$t = 0.168 \cdot in$	Plate Thickness (degraded by damage tol.)
$W := 2 \cdot 170 \cdot lbf \cdot LF \cdot FF$	$W = 782 \cdot lbf$	Applied limit load
$r := \frac{R}{D}$	$r = 1.336$	e/D ratio

0.172" ρ greater than 0.168



Tensile Failure Mode

$At := (2 \cdot R - D) \cdot t$	$At = 0.074 \cdot in^2$	Tensile area
$Put := \frac{W \cdot SF}{At}$	$Put = 1.594 \cdot 10^4 \cdot psi$	Ultimate stress in tension
$MS4a := \frac{Fyt}{Put} - 1$	$MS4a = 1.20$	**Margin of Safety**, tension

OK

Shear Failure Mode

$ed := (R - D \cdot 0.5)$	$ed = 0.219 \cdot in$	Lug edge distance
$As := (2 \cdot ed \cdot t)$	$As = 0.074 \cdot in^2$	Shear out area of joint

$Pus := \frac{W \cdot SF}{As}$ $Pus = 1.594 \cdot 10^4 \cdot psi$ Ultimate stress in shear

$MS4b := \frac{Fys}{Pus} - 1$ $MS4b = 0.50$ **Margin of Safety**, shear

OK

Bearing Failure Mode

$Ab := (Dan4 \cdot t)$ $Ab = 0.042 \cdot in^2$ Shear out area of joint

$Pub := \frac{W \cdot SF}{Ab}$ $Pub = 2.793 \cdot 10^4 \cdot psi$ Ultimate stress in bearing

$MS4c := \frac{Fbry \cdot (r - 0.5)}{Pub} - 1$ $MS4c = 0.50$ **Margin of Safety**, bearing

OK

Weld Failure

$Lw := 3.6 \cdot in$ Length of weld

$Aw := (0.125 \cdot in) \cdot 2 \cdot Lw$ $Aw = 0.9 \cdot in^2$ Shear area of weld

$Puw := \frac{W \cdot SF}{Aw}$ $Puw = 1303 \cdot psi$ Ultimate shear stress in weld

$wcf := 0.8$ Weld correction factor

$MS4d := \frac{Fys \cdot wcf}{Puw} - 1$ $MS4d = 13.70$ **Margin of Safety**, weld

OK

3.4.2 CLAMP ANALYSIS (D3064-1)

$D := 0.257 \cdot in + 0.005 \cdot in$ $D = 0.262 \cdot in$ Hole Diameter (with manufacturing tol.)

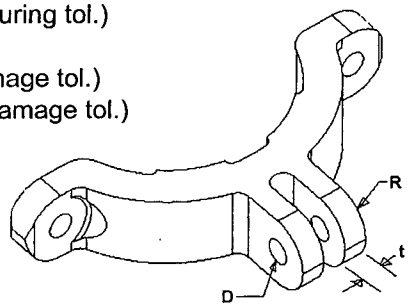
$Dan4 := 0.250 \cdot in$ AN4 Bolt Diameter

$R := 0.375 \cdot in - 0.025 \cdot in$ $R = 0.35 \cdot in$ Lug Radius (degraded by damage tol.)

$t := 0.242 \cdot in - 0.020 \cdot in$ $t = 0.222 \cdot in$ Lug thickness (degraded by damage tol.)

$n := 2$ Number of lug plates

$r := \frac{R}{D}$ $r = 1.34$ e/D ratio



$W = 782 \cdot lbf$

Tensile Failure Mode

$At := (2 \cdot R - D) \cdot t \cdot n$ $At = 0.194 \cdot in^2$ Tensile area of joint

$Pt := \frac{W \cdot SF}{At}$ $Pt = 6.032 \cdot 10^3 \cdot psi$ Ultimate tensile stress

$MS4e := \frac{Fyt}{Pt} - 1$ $MS4e = 4.80$ **Margin of Safety**, tension

Shear Failure Mode

$ed := \left(R - \frac{D}{2}\right)$ $ed = 0.219 \cdot in$ Lug edge distance

$As := (2 \cdot ed \cdot t) \cdot n$ $As = 0.194 \cdot in^2$ Shear out area of joint

$Ps := \frac{W \cdot SF}{As}$ $Ps = 6032 \cdot psi$ Ultimate shear stress

$MS4f := \frac{Fys}{Ps} - 1$ $MS4f = 2.97$ **Margin of Safety**, shear tear-out